Human Computer Interaction

Chapter 1: Introduction

Learning outcomes

❑ After completing this chapter students are expected to:

▪ Know the definition of Human- Computer Interaction

▪ Describe the Human Interface Devices

▪ Know about the user interface engineering

▪ Understand the relation ships b/n HCI and other field

▪ Understand the goal of HCI

Introduction to HCI

❑ Human-computer interaction (HCI) is a field of study that focuses on the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.

❑ It is study of interaction between people (users) and computers.

❑ "It is the neither the study of humans nor the study of technology, but rather the bridging between those two."

❑ It is concerned with an interdisciplinary field in computer scientists, engineers, psychologists, social scientists etc.
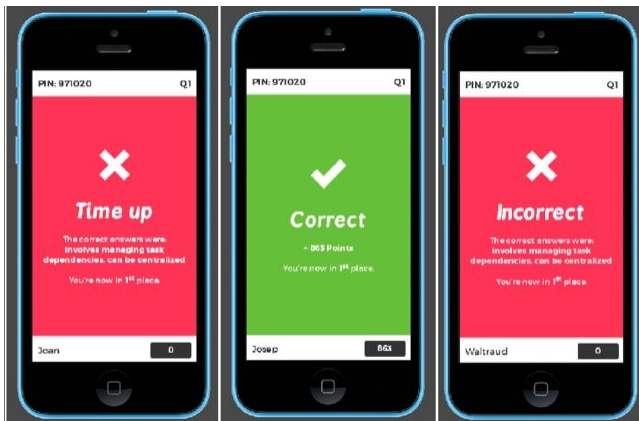
What is Interaction?

❑ It refers to the communication exchange between humans and computer systems

❑ An abstract model by which human interact with the computing device

❑ It focus on interfaces[hardware/software]

❑ It is a two-way conversation

❑ Is a kind of action which occurs when two or more objects have an effect on each other; in some cases, a difference between the two should be distinguished.

❑ HCI strives to design interactions that are efficient, effective, and enjoyable for the user

❑ In communication, interaction communication occurs when sources take turns in transmitting messages between one another.

❑ In interaction, the term affordance is used by perceptual psychologists. It is also used in the field of cognitive psychology

Interface vs. Interaction

Interface

- A communication channel
- Visual representation, organization of elements
- Mobile phone app layout
- Blueprint of a house

Interaction

- Conversation that takes place
- User actions and system responses
- User swiping through app screens
- Person walking through the house

What is Interaction?

Some of the elements that contribute to interaction in HCI:

❑ **User interface (UI):** This is medium through which the communication b/n human and computer take place, including the visual elements, buttons, menus, and other controls.

❑ **Input devices:** These are the tools users use to provide information to the computer, such as keyboards, mice, touchscreens, or even voice commands.

❑ **Output devices**: These are how the computer communicates information back to the user, such as monitors, speakers, or printers.

❑ **Interaction style**: This refers to the overall way users interact with the system, such as through menus, commands, or natural language.

What is Interaction?
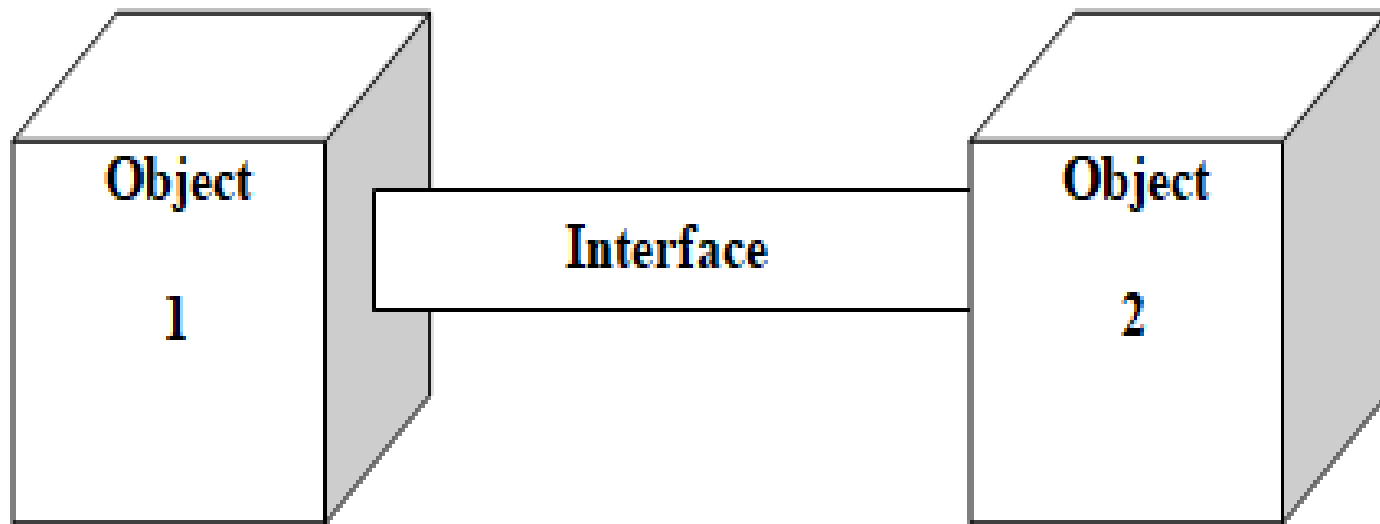
Human Interface Devices

❑ A human interface device or HID is a type of computer device that interacts directly with and takes input from humans, such as the computer keyboard, computer mouse, joystick, graphics tablet, and others.

❑ HID devices can be used for input or output.

❑ The design of HID devices is an important part of HCI.

❑ HIDs should be easy to use, comfortable to operate, and provide clear feedback to the user.

❑ HCI specialists consider factors such as ergonomics, usability, and accessibility when designing and evaluating HID devices.

User interface engineering

- ❑ User interface engineering is the engineering of the user interface.
- ❑ It focuses on the technical aspects of building interfaces that are not only usable but also efficient and effective for the user
- ❑ UI engineering contributes to HCI:
- ▪ UI engineering translates the principles of user-centered design from HCI into concrete interfaces.
- ▪ UI engineers employ various techniques to ensure the interface is easy to learn and use.
- ▪ UI engineering considers how users will accomplish tasks within the system.
- ▪ UI engineers work closely with HCI specialists to understand user needs and translate them into feasible technical solutions.
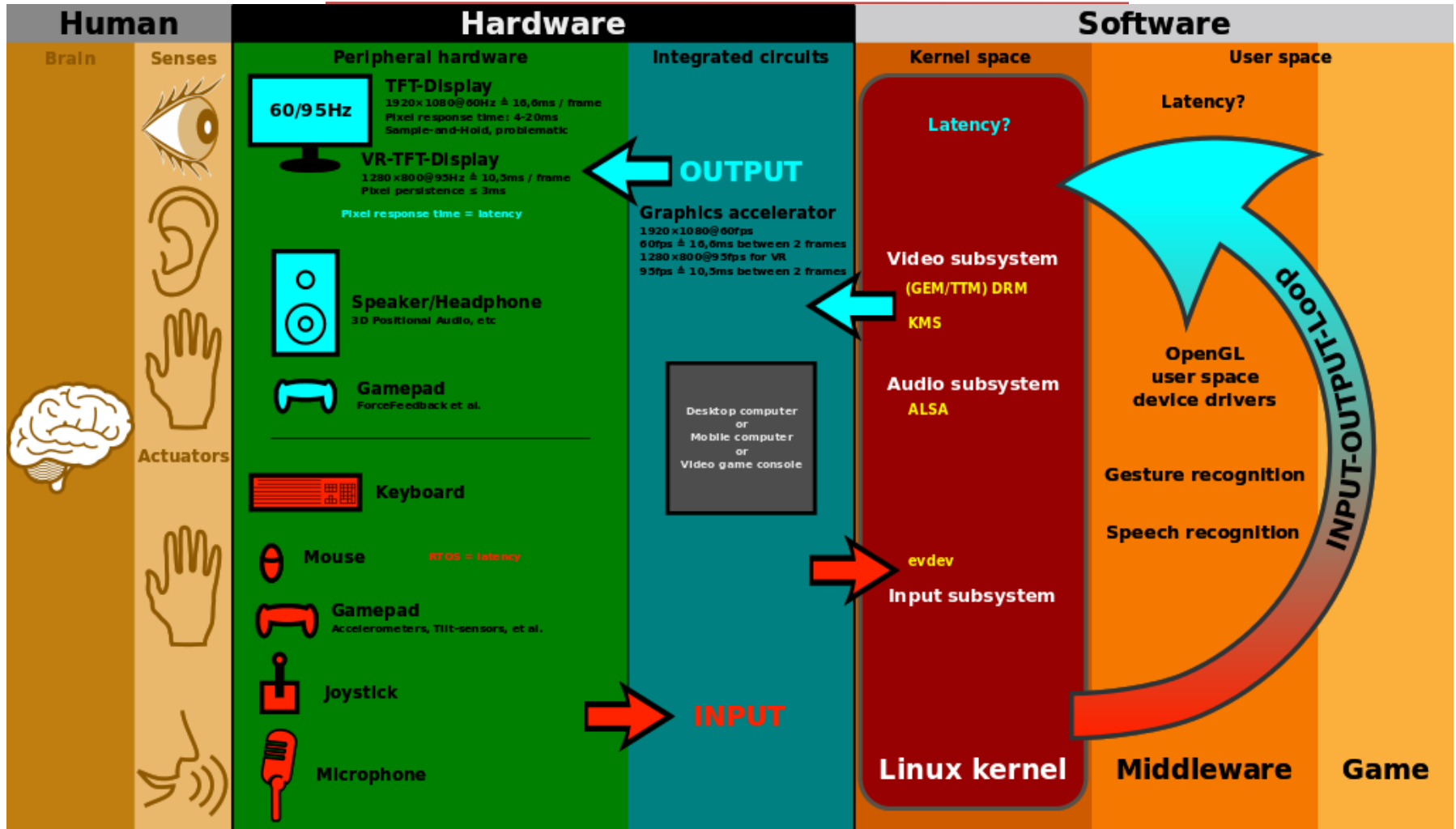
User interface engineering

❑ **Some key HCI concerns that UI engineering addresses**
- Usability
- Accessibility
- User Experience
- Learnability
- Error Prevention and Recovery

❑ E.g Design an ATM interface that is easy to use for people with varying levels of technical experience and comfort with computers.

❑ **UI Engineering Solutions**
- Simple and Clear Layout
- Limited Options on Each Screen
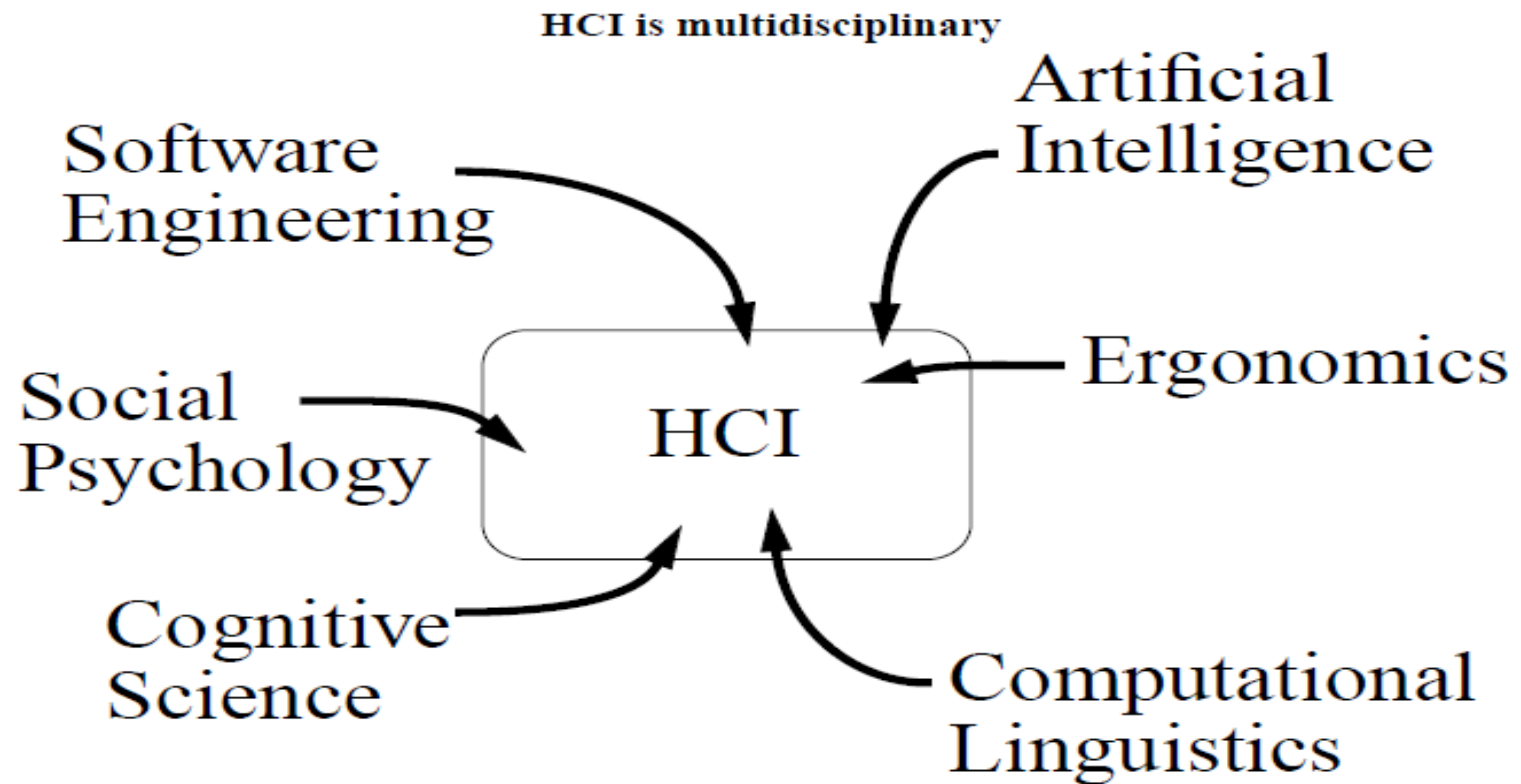- Clear Feedback
- Error Prevention
- Accessibility Features

User interface

Graphical User interface

What is HCI?

❑ "The study of how humans and computers can work with each other on common tasks".

HCI is multidisciplinary

Software Engineering

Artificial Intelligence

Social Psychology

HCI

Ergonomics

Cognitive Science

Computational Linguistics

Software Engineering

❑ Software Engineering is the process of solving customer problems by the systematic development of high quality software systems in order to meet their requirements within cost, time and other constraints.

How HCI integrates with software engineering

❑ Integrating User Needs by understanding users need

❑ Designing user interfaces that are intuitive, user-friendly, and aesthetically pleasing

❑ Software development with HCI principles involves an iterative design process. Prototypes are built, tested with users, and refined based on their feedback.

❑ **Benefits of HCI in Software Engineering:**

▪ Increased User Adoption

▪ Reduced Development Costs

▪ Improved User Satisfaction

▪ HCI in software engineering helps to bridge the gap between the technical aspects of software and the needs of the human users.

Artificial Intelligence

❑ AI is an area of Computer Science that emphasizes the creation of intelligent machines that work and react like humans.

❑ **HCI plays a crucial role in Artificial Intelligence**

▪ HCI helps design interfaces that explain how an AI system arrives at decisions

▪ HCI principles are used to create chatbots and virtual assistants that understand natural language

▪ HCI informs the design of AI systems that personalize the user experience

▪ HCI principles are used to evaluate AI prototypes and identify areas for improvement

▪ AI is being increasingly used in HCI to improve the user experience

❑ **AI are designed for:**

▪ Natural language processing

▪ Recommender systems

▪ Chatbots

▪ Problem Solving

Ergonomics

❑ An applied science concerned with designing and arranging things peoples use so that the people and things interact most efficiently and safely.

❑ HCI professionals apply ergonomic principles to design interfaces that are comfortable, efficient, and effective for users.

❑ **This means considering factors such as:**

▪ Physical ergonomics :-This refers to the design of the physical components of the interface, such as the keyboard, mouse, and screen.

▪ Cognitive ergonomics: This refers to the mental demands of using the interface.

▪ Organizational ergonomics: This refers to the way that work is organized and how technology is integrated into the workplace

❑ **The benefits of using ergonomics in HCI**

▪ Increased user productivity

▪ Reduced risk of RSIs and other musculoskeletal disorders

▪ Improved user satisfaction

▪ Lower training costs

Computational Linguistics

❑ It is the branch of linguistics in which the techniques of computer science are applied to the analysis and synthesis of language and speech.

❑ It is the interdisciplinary field that studies the interface between computer science and linguistics.

❑ One of the main goals of HCI in computational linguistics is to develop natural language interfaces (NLIs) that allow users to interact with computers using natural language.

❑ NLIs can be used for a variety of purposes, such as querying databases, controlling devices, and generating text.

❑ HCI research in computational linguistics has made significant progress in recent years.

Social Psychology

- ❑ It is the branch of psychology that deals with social interactions including their origins and their effects on the individual.

- ❑ It helps us to understand how people think, feel, and behave in social situations

- ❑ **The ways that social psychology is used in HCI**

- ▪ Used in understanding user expectations and norms

- ▪ Can be used to design interfaces that are persuasive and influential.

- ▪ It can help us understand how people work together in groups.

- ▪ It can help us understand how people's sense of self is shaped by their social groups.

Cognitive Science

❑ The study of thought, learning and mental organization which draws on aspects of psychology, linguistics, philosophy, and computer modeling.

❑ It is the interdisciplinary study of mental processes, including how people think, learn, and remember.

❑ It provides HCI with a foundation for understanding how people interact with technology.

❑ **The ways that cognitive science is used in HCI:**

▪ Understanding human memory

▪ How people focus their attention on tasks.

▪ Understanding problem-solving

Human- Computer Interaction:

❑ Human- Computer Interaction (HCI) is the study and the practice of usability. It is about understanding and creating software and other technology that people will want to use

❑ In human-computer interaction, computer transparency is an aspect of user friendliness which prevents the user from worrying about technical details
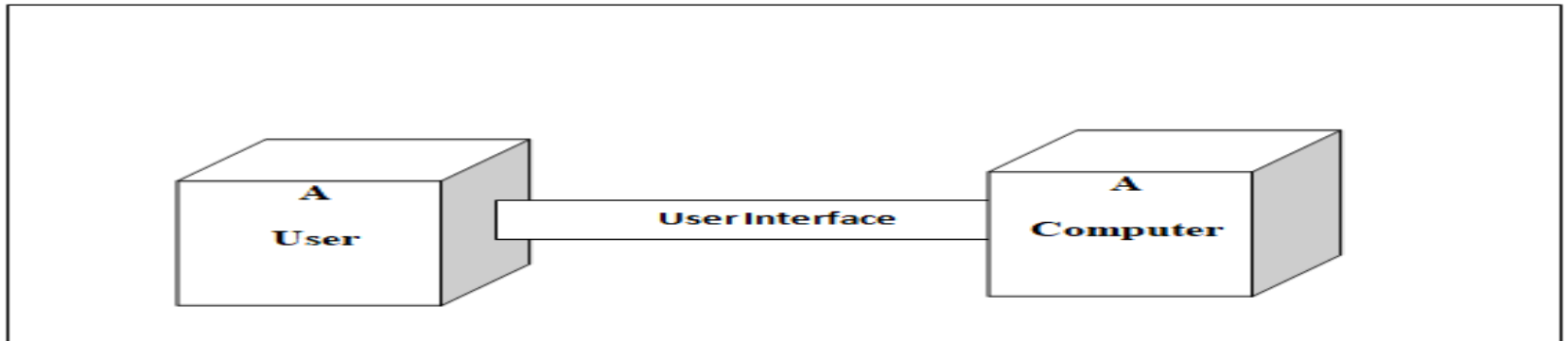
Human- Computer Interaction

HCI is Not about

❑ Making the interface look pretty

❑ Only about desktop computers (and that goes for computing as well!)

HCI is about:

❑ Understanding the users

❑ Understanding users tasks

❑ Understanding the surrounding environment

❑ GUI requirements gathering and analysis

❑ Design prototype

❑ Evaluate the system

❑ Has a role in the design and development

Human- Computer Interaction:

HCI consists of three parts:

1. Human: could be an individual user or a group of users.

2. Computer: could be any technology ranging from the general desktop computer to a large scale computer system.

3. Interaction: any direct or indirect communication between a human and computer.

Why Care About People?

❑ HCI is study of ways that people use and interact with computing devices.

❑ And practice of making computers easier for people to use.

✳ Is that possible? Yes!

❑ It happens when people who design computers and software keep in mind that they are designing for other people(So make easy to use).

❑ The same is true of games

   ➢ People want to play games

The goals of HCI

❑ The goal of HCI *"is to develop or improve the safety, utility, effectiveness, efficiency and usability of system that include computers."*

❑ Or to produce usable and safe systems, as well as functional systems.

❑ In order to fulfill that, developers must attempt to:

  ➢ Understand how people use technology

  ➢ Building suitable systems

  ➢ Achieve efficient, effective, and safe interaction

  ➢ Put people first

HCI/UI DESIGN CYCLE:
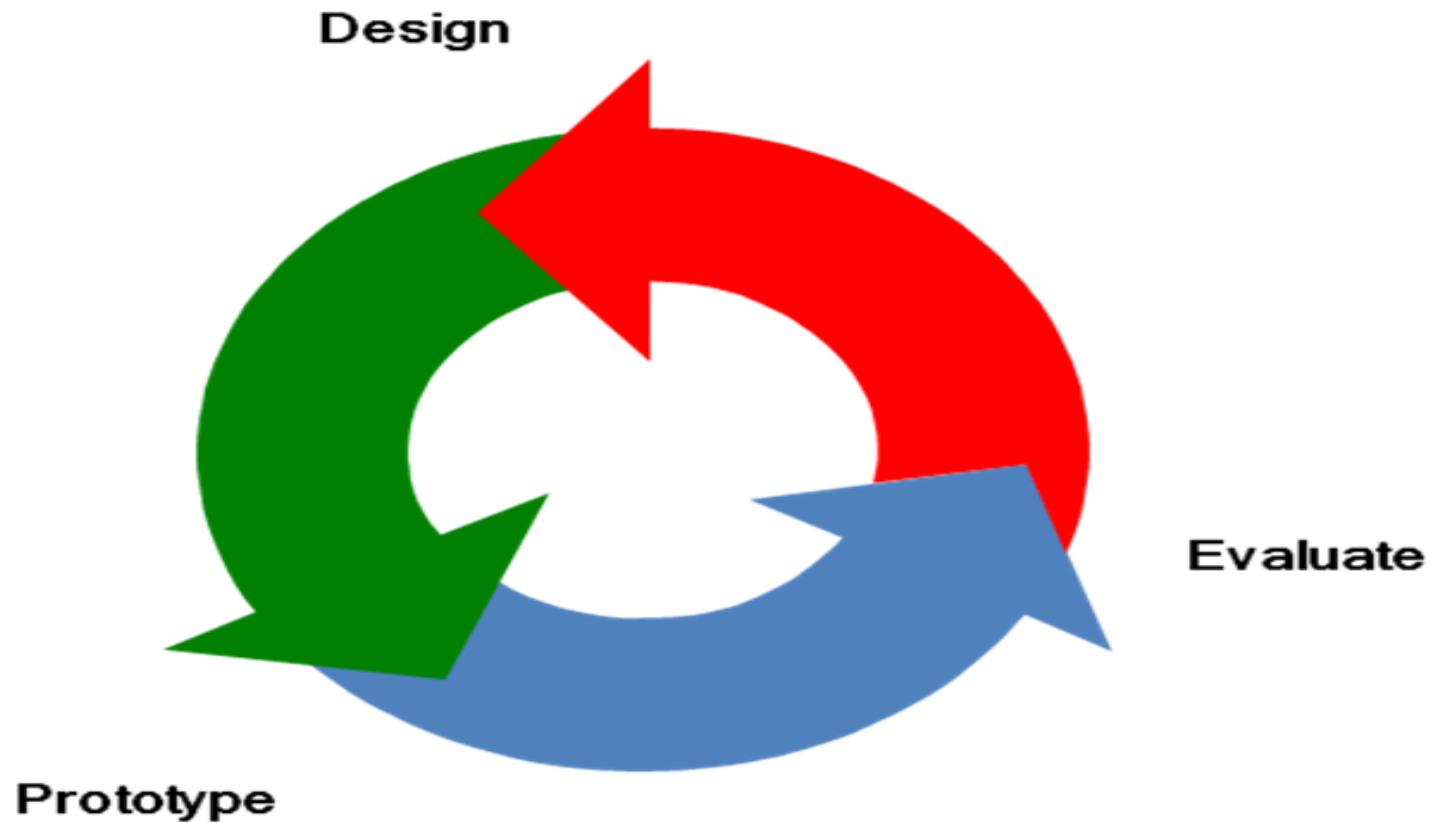
❑Reading assignment

Historical background of HCI

Thank you!
Questions?